

Valency and Aspectuality

Syntactic and Semantic Motivation for the Notion of "Change of State"

Certain semantic properties of verbs have syntactic consequences in that they restrict the ability of the verb to occur in particular constructions. It will be argued that such semantic properties may not be introduced for syntactic purposes alone, but that the semantic nature and relevance of these properties has to be proved. In the following sections it will be shown which semantic verbal properties have to be assumed to capture the restrictions for the occurrence of a certain syntactic pattern in German, the so-called *an*-construction. These same properties will also turn out to be necessary for the explanation of semantic phenomena like sentential aspect. Finally, the meaning of the introduced notions and their theoretical status will be discussed.

The *an*-construction as in (1a) can occur with a lot of verbs which subcategorize for a nominative and an accusative NP.

- (1a) sie malte an einem Bild
she painted at a picture; 'she was painting a picture'
- (1b) sie malte ein Bild
'she painted a picture'

The PP expresses the internal argument usually realized as a NP (1b).¹ The *an*-construction can be found with verbs like those in (2a), but not with the likewise transitive verbs listed in (2b):

- (2a) bauen 'to build', malen 'to paint', reparieren 'to repair', manipulieren 'to manipulate', kochen 'to cook', backen 'to bake', bügeln 'to iron', nähen 'to sew', rechnen 'to calculate', schreiben 'to write', stricken 'to knit';
- (2b) kaufen 'to buy', beschreiben 'to describe', sehen 'to see', streicheln 'to pet', quälen 'to tease', stehlen 'to steal', photographieren, 'to photograph'

As one can see, the PP-alternation is not restricted to a class of verbs characterized by a particular valence frame like [NP_{nom}, NP_{acc}].² The crucial properties seem to be semantic in nature. However, defining this verbal subclass in terms of thematic roles will prove fruitless, for some agent-theme verbs allow the prepositional construction (3e) and some don't (3c, 3d).

¹ The *an*-construction is said to express imperfectivity (Brinkmann 1962), duration (Russinova 1976), non-completion (Filip 1989) or partitivity (Krifka 1989b). Additionally, a small corpus-based investigation suggests that the *an*-construction is used to describe events whose completion is hard to foresee, cf. the following example from the German newspaper FAZ: *Seien wir froh, daß wir jetzt die Demokratie haben, und bauen wir mit aller Kraft an unserem gemeinsamen europäischen Haus*, 'we should be happy that we now have democracy; and now let us build, with all our might, (at) our common European house'.

² That is supported by the fact that there are some verbs like *arbeiten* 'to work', *hantieren* 'to tinker', *tüfteln* 'to fiddle about', which can only be constructed with a PP-*an* but not with a direct object.

- (3a) sie kannte einen Klempner / *an einem Klempner
'she knew a plumber'
- (3b) sie fand ihren Schlüssel / *an ihrem Schlüssel
'she found her key'
- (3c) sie sprengten den Felsen / *an dem Felsen
'they blew up the rock'
- (3d) sie streichelte ihre Katze / *an ihrer Katze
'she petted her cat'
- (3e) sie schrieb ihre Memoiren / an ihren Memoiren
'she wrote her memoirs'

Instead of appealing to thematic roles, classifying verbs according to their aspectual properties seems to be more promising.³ Stative verbs like *lieben* 'to love', *wünschen* 'to wish' or *kennen* 'to know' (3a) as well as achievement verbs like *sprengen* 'to blow up', *gewinnen* 'to win' or *finden* 'to find' (3b, 3c) exclude this *an*-construction. But even among those verbs that describe an event as having a certain duration, there are some which go with a PP-*an* (3e) and some which do not (3d). Apparently, the decisive difference between these two examples is that verbs like *schreiben* 'to write', *bauen* 'to build', or *reparieren* 'to repair' lexically induce a change-of-state reading. This is not the case with verbs like *streicheln* 'to pet', or *hänseln* 'to tease, to mock'. Thus, the distribution of the PP-*an* is restricted to verbs which entail not only the duration of the event described (like 3d, 3e, but not 3c), but also a change of state in the referent of the internal argument (like 3c, 3e, but not 3d).⁴

When new concepts (like "change of state" or "duration") are introduced into a theory, they should be well defined and their necessity for the theory needs to be shown, independent of the solution to the problems for which they have been introduced.⁵ Therefore, semantic properties which are invoked as restrictions on syntactic phenomena should meet the following two requirements: A) They are independently motivated, that is to say, they are necessary not only for the explanation of syntactic but also semantic phenomena; B) Their definition and determination is supported by operational methods and their status in a semantic theory is defined. The rest of the paper is mainly devoted to the question of how the above postulated semantic notions meet requirement A. That will be done by proving that these notions are relevant for explaining aspectual phenomena. Some remarks concerning requirement B will conclude this paper.

Aspect is a compositional semantic phenomenon which is partly driven by semantic properties of verbs. A classic approach is Vendler's (1957) aspectual classification of VPs.⁶ But the

³ Aspectual properties can be understood as those verbal properties which determine the way of presenting the internal structure of situations the verb can refer to.

⁴ For independent reasons, not discussed here, the *an*-construction is restricted to non-prefixed verbs.

⁵ This concerns particularly thematic roles which are usually conceived of as semantic concepts, but are used for the explanation of syntactic phenomena. Not much effort has been made to prove the semantic relevance of thematic roles. There are for example only few approaches integrating thematic roles in model theoretic semantics, cf. Dowty (1989), Chierchia / McConnell-Ginet (1990).

⁶ The classes proposed by Vendler are: 1) states (no progressive): *love*, *know*; 2) activities (progressive possible, durational adverbials like *for 15 minutes*) *run*, *push a cart*; 3) accomplishments (progressive possible,

membership of a VP to one of these classes is not dependent on verbal properties alone. A verb like *essen* 'to eat' can occur in activity (4a, 4c) as well as in accomplishment expressions (4b):

- (4a) sie aß (zwanzig Minuten lang / *in zwanzig Minuten)
'she ate (for twenty minutes / in twenty minutes)'
- (4b) sie aß zehn Pflaumen (in fünf Minuten / *fünf Minuten lang)
'she ate ten plums (in five minutes / for five minutes)'
- (4c) sie aß Pflaumen (zehn Minuten lang / *in zehn Minuten)
'she ate plums (for ten minutes / in ten minutes)'

Thus, most approaches try to account for aspectual phenomena in a compositional way. Crucial to determining the aspectual class of an expression are not only properties of the verb, but also the referential type of the NP in direct object position. Krifka (1989a, 1989b) points out that if a relation of incrementality holds between the verb and its object argument, then definitely quantified NPs will lead to an accomplishment reading of the VP, and not-definitely quantified NPs (e.g. mass nouns, bare plurals) will lead to an activity reading. Incrementality can be conceived of as a homomorphic function⁷ from the structured theme argument into a structured domain of events (cf. Dowty 1991: 567). To put it simply, it is due to the meaning of the verb that in a sentence like (5a) the temporal structure of the painting event corresponds to the spatial structure of the picture, which comes into existence bit by bit in the course of the painting event.

- (5a) sie malte ein Bild ihres Großvaters (in zwei Tagen)
'she painted a picture of her grandfather (in two days)'
- (5b) sie quälte ihren Großvater (*in zwei Tagen)
'she teased her grandfather (in two days)'

Both (5a) and (5b) have a definitely quantified NP in object position. But, only (5a) gets an accomplishment reading because *quälen* 'to tease' doesn't show a lexical relation of incrementality between the verb and its internal argument. On the other hand, regardless of the fact that *essen* 'to eat' is an incremental verb, (4a) and (4c) don't receive an accomplishment reading, because the object NP is not definitely quantified.

Krifka's theory makes reliable predictions about two-place verbs denoting events perceived as non-punctual. It will be shown below that the notion of incrementality is insufficient for describing the aspectual behaviour of verbs if one- and two-place punctual verbs are to be taken into account as well. My assumption is that "change of state" and "duration" are the crucial lexical properties of verbs for determining aspectual class membership.⁸ If we conceive of these two properties as being binary features, we should expect that a cross-classification of verbs according to these features will lead to four distinct classes that are aspectually relevant.

span-of-time adverbials like *in 15 minutes*) draw a circle, run a mile; 4) achievements (no progressive, time point adverbials like *at 5 o'clock*) win the race, recognize, reach the hilltop.

⁷ A homomorphism is a function which preserves a structure defined on its domain in a comparable structure defined on its range. (for a formal definition see Landman 1991: 74ff).

⁸ This only holds for verbs that can denote events. Stative verbs are not taken into consideration.

This is in fact the case for two-place verbs as well as for one-place verbs, as the examples in (6) will show. Thus, the verbs themselves are lexically marked whether they refer to events perceived as taking a certain duration [+DUR] or not [-DUR]. The semantic relation of "change of state" between the verb and one of its arguments is notated on that argument [+CS]. The referent of the expression filling this argument position undergoes a certain change of state.

A verb's membership in an aspectual class is indicated by its adverbial modifiability: A) span-of-time adverbials (SpanADV) like PPs headed by *innerhalb von* or *in*: *innerhalb von / in zehn Minuten* 'in ten minutes'; B) durational adverbials (DurADV) like PPs headed by *lang*: *zehn Minuten lang* 'for ten minutes'; C) iterative-durational adverbials (IterADV) like PPs headed by *lang* with the implication "several times": *zwei Jahre lang* 'for two years' (\Rightarrow several times during two years). Simplex verbs will show the following aspectual behaviour depending on the two properties "duration" and "change of state":

+DUR/+CS	\Rightarrow	SpanADV	*DurADV	*IterADV
+DUR/-CS	\Rightarrow	*SpanADV	DurADV	*IterADV
-DUR/+CS	\Rightarrow	*SpanADV	*DurADV	*IterADV
-DUR/-CS	\Rightarrow	*SpanADV	*DurADV	IterADV

This is exemplified in (6). (The first argument of a two-place verb is the internal one.)⁹:

- (6a) *essen*[+DUR](x[+CS].y[-CS]) 'to eat'
 sie aß zwei Äpfel (innerhalb von fünf Minuten / *fünf Minuten lang)
 'she ate two apples (in five minutes / for five minutes)'
- (6b) *streicheln*[+DUR](x[-CS].y[-CS]) 'to pet, to stroke'
 sie streichelte ihren Hund (*innerhalb von fünf Minuten / fünf Minuten lang)
 'she petted her dog (in five minutes / for five minutes)'
- (6c) *gelingen*[+DUR](x[+CS]) 'to gel'
 der Wackelpudding gelierte (innerhalb einer Stunde / *eine Stunde lang)
 'the jello gelled (in one hour / for one hour)'
- (6d) *laufen*[+DUR](x[-CS]) 'to run'
 sie lief (*innerhalb einer Stunde / eine Stunde lang)
 'she ran (in one hour / for one hour)'
- (6e) *sprengen*[-DUR](x[+CS].y[-CS]) 'to blow up'
 sie sprengte das Bundeskanzleramt (*eine Stunde lang \Rightarrow repeatedly)¹⁰
 'she blew up the Federal Chancellery (for one hour)'
- (6f) *treffen*[-DUR](x[-CS].y[-CS]) 'to meet'
 sie traf ihn in einem Hotel (einige Jahre lang \Rightarrow repeatedly)
 'she met him in a hotel (for several years)'
- (6g) *platzen*[-DUR](x[+CS]) 'to burst'
 das Kondom platzte (*zwei Minuten lang \Rightarrow repeatedly)
 'the condom burst (for two minutes)'

⁹ The example sentences contain definitely quantified NPs, because only then do certain aspectual properties of verbs show up, as predicted by the above mentioned rule. In addition, it has to be taken into consideration that these tests may lead to different results when applied to complements with pluralic interpretation: *for twenty minutes people left the station*; *for twenty minutes the man left the station*.

¹⁰ On certain readings, span-of-time adverbials are possible with punctual verbs when they refer to a span of time between a certain point of time and the event itself. This reading is left out here.

- (6h) *klopfen*[-DUR](x[-CS])¹¹ 'to knock'
 sie klopfte (einige Sekunden lang \Rightarrow repeatedly)
 'she knocked (for a few seconds)'

So, what predictions are made by this approach, as compared to Vendler (1957) and Krifka (1989a, 1989b)? First of all, achievements don't constitute an aspectually coherent class: Punctual verbs, which entail a change of state behave aspectually different from those which don't. Second, according to the referential type of the NP, verbs of the type [+DUR,+CS] (and only those) can occur in activity or accomplishment constructions. In addition, it is predicted that two-place verbs which omit their internal argument (the +CS-argument) can't be used in accomplishment expressions. The same holds for one-place verbs with an external argument.¹² Third, punctual and non-punctual verbs are aspectually sensitive to the same semantic property, namely "change of state".¹³ Finally, the aspectual behaviour of one-place and two-place verbs can be described in the same way, based on the two properties "duration" and "change of state".

The preceding section has shown that independent motivation¹⁴ can be found for those lexical semantic properties which show syntactic consequences.¹⁵ This last section should shed some light on the meaning of the proposed notion "change of state". In what sense can it be maintained that the internal argument of a verb like *bauen* 'to build' undergoes a change of state while the argument of a verb like *streicheln* 'to pet, to stroke' doesn't?

- (7a) er streichelte seine Katze
 'he petted his cat'
 (7b) er streichelte seine Katze bis sie sich wohl fühlte
 'he petted his cat until it felt cozy'

Of course, we can imagine that the cat in (7a) was pleased to get petted. It probably was in a better mood than it was before the petting-event. We can even make the change of state explicit, like in (7b). Nonetheless, *streicheln* isn't a verb of the type [+CS]. There may be petting-events where either no change of state takes place (8a) or where the occurring change of state

¹¹ Mori / Löbner / Micha (1992: 226f.) show that Japanese verbs like *tatak-* 'to knock' behave aspectually different from other verbs in that they allow a continuative verb form with repetitive-progressive interpretation.

¹⁴ Due to the aspectual influence of prefixes, complex verbs like *aufessen* 'to eat up' can show up as accomplishments, even in intransitive use with only an external argument syntactically realized.

¹³ As far as non-punctual verbs are concerned, it seems to be the case that Krifka's class of incremental verbs is extensionally almost identical to the class of [+DUR,+CS]-verbs.

¹⁴ The search for independent motivation can be a step towards an adequate description of the data. It supports the assumption that certain postulated categories and relations are of general grammatical relevance. Furthermore, independent motivation of this sort points to where the explanation of the described phenomena will most likely be found. Thus, future investigations might perhaps show to what degree the restrictive function of the postulated properties for the *an*-construction is dependent on their function in aspectual composition.

¹⁵ Further support for the assumption that the notion of change of state is of grammatical relevance is given by psycholinguistic experiments on linking principles, cf. Gropen / Pinker / Hollander / Goldberg (1991).

is obviously not lexically predicted by the verb's meaning (8b), whereas there is no building-event without something being brought into existence (and in this way existentially changing its state):

- (8a) er streichelte seine Katze, aber sie bemerkte es gar nicht
'he petted his cat but it didn't notice'
(8b) er streichelte seine Katze bis sie sich erbrach
'he petted his cat until it threw up'

A change of state which is contextually expressed (8b) or conventionally implicated (7a) has to be distinguished from a lexically induced change of state. Only the latter will be conceived of as a semantic relation between the verb and one of its arguments. I will regard this semantic relation as a lexical entailment (Cf. Dowty 1991). That is to say, the change of state follows from the meaning of the verb, so that the verb can't be used without expressing this change. This kind of 'change of state' only holds for *bauen* 'to build' and not for *streicheln* 'to pet'.

Among those verbs which entail a change of state is *steigen* 'to rise'. Yet, *steigen* doesn't admit an accomplishment reading, but is rather interpreted as an activity:

- (9a) die Temperatur stieg einige Tage lang / *in einigen Tagen
'the temperature rose for some days / in some days'¹⁶

To use a verb like *steigen* 'to rise' means to evaluate an event with respect to a kind of unbounded scale which is typically expressed by two qualitative adjectives (*high* \Leftrightarrow *low*). This scale includes an indefinite amount of possible states. Verbs like *bauen* 'to build' or *essen* 'to eat' lead to the interpretation that a particular state holds before the event and the opposite state after the event. There is no scale involved. The temperature can be 'more' high or 'less' high, but we don't talk about apples as 'more' eaten or 'less' eaten or about houses as 'more' built or 'less' built (although a house can be partly built).

A building-event is delimited by the completeness of the thing that has been built while a raising-event (temperature, etc.) can always be thought of as extendable. At least, there is no lexically entailed state which marks the endpoint of the event. We can infer from (10a) that the house existed after the described event. From (10b) we can only conclude that the temperature was higher than before but not that the temperature was high.

- (10a) sie hat ein Haus gebaut
'she has built a house'
(10b) die Temperatur ist gestiegen
'the Temperature has risen'

I will call the change of state entailed by verbs like *bauen* 'to build' "polarity change", and the one entailed by *steigen* 'to rise' "scalar change". The feature [CS] used in (6) refers to a polarity change and not to scalar change.

¹⁶ It has to be taken into consideration that in addition to the referential type of a NP, there are other means of inducing accomplishment readings: *die Temperatur stieg in den letzten drei Tagen um 10 Grad*, 'the temperature rose by 10 degrees in the last three days'.

Besides these two groups of change-of-state verbs, there is a third one which exhibits both properties. Verbs like *waschen* 'to wash' or *trocknen* 'to dry' are associated with a scale (*dirty* \Leftrightarrow *clean*; *wet* \Leftrightarrow *dry*), but these scales are bounded in the sense that they define an end-state which can't be exceeded. A shirt can become more and more clean by washing it, but at a certain point this process is delimited by the state of being clean (11a versus 11b).

- (11a) sie wusch das Hemd bis es sauber war
'she washed the shirt until it was clean'
(11b) ??die Temperatur stieg bis sie hoch war
'the temperature rose until it was high'

In fact, verbs like *waschen* 'to wash', *reparieren* 'to repair', *bügeln* 'to iron' show the aspectual behaviour of both polarity-change verbs and scalar-change verbs: they allow time span and durational adverbials when constructed with a definitely quantified object NP:

- (12a) er wusch das Hemd in zehn Minuten
'he washed the shirt in ten minutes'
(12b) er wusch das Hemd ein paar Minuten lang
'he washed the shirt for a few minutes'

To conclude, the lexical semantic properties which are given in (6) in a shorthand notation are to be understood as lexical entailments. In addition to (6), it has to be specified a) whether the verb meaning entails an evaluation of the described event with respect to a scale, b) which properties define this scale, and c) whether a certain end-state of the event is lexically determined.

References

- Brinkmann, H. (1962): *Die deutsche Sprache. Gestalt und Leistung*. - Düsseldorf: Schwann.
- Chierchia, Gennaro; McConnell-Ginet, Sally (1990): *Meaning and Grammar. An Introduction to Semantics*. - Cambridge, Mass., London: MIT.
- Dowty, David (1989): "On the Semantic Content of the notion of 'Thematic Role'". - In: G. Chierchia, B.H. Partee, R. Turner (eds.): *Properties, Types and Meaning*, Vol. II. (Dordrecht: Kluwer) 69-129.
- (1991): "Thematic Proto-Roles and Argument Selection". - In: *Language* 67, 547-619.
- Filip, Hana (1989): "Aspectual Properties of the *an*-Construction in German". - In: W. Abraham, T. Janssen (Hgg.): *Tempus - Aspekt - Modus* (Tübingen: Niemeyer) 259-292.
- Gropen, Jess; Pinker, Steven; Hollander, Michelle; Goldberg, Richard (1991): "Affectedness and Direct Objects: The Role of Lexical Semantics in the Acquisition of Verb Argument Structure". - In: *Cognition* 41, 153-195.
- Krifka, Manfred (1989a): *Nominalreferenz und Zeitkonstitution. Zur Semantik von Massentermen, Pluraltermen und Aspektklassen*. - München: Fink.
- (1989b): "Nominalreferenz, Zeitkonstitution, Aspekt, Aktionsart: Eine semantische Erklärung ihrer Interaktion". - In: W. Abraham, T. Janssen (Hgg.): *Tempus - Aspekt - Modus* (Tübingen: Niemeyer) 227-258.
- Landman, Fred (1991): *Structures for Semantics*. - Dordrecht: Kluwer.
- Mori, Yoshiki; Löbner, Sebastian; Micha, Katharina (1992): "Aspektuelle Verbklassen im Japanischen". - In: *Zeitschrift für Sprachwissenschaft* 11. - Dordrecht: Reidel.
- Russinova, Maria V. (1976): "Die Präposition 'an' als Komponente beim Ausdruck der Aktionsarten des Verbs". - In: *Deutsch als Fremdsprache* 13, 119-121.
- Vendler, Zeno (1957): "Verbs and Times". - In: *The Philosophical Review* LXVI, 143-160.